State of Alaska
Department of Natural Resources
Division of Geological and Geophysical Surveys
and
The Alaska State Energy Office

for

ALASKA OIL AND GAS DEVELOPMENT ADVISORY BOARD

This study is in response to AS 38.06, Sec. 38.06.070 (2) that the board shall consider "the existence and extent of present and projected local and regional needs for oil and gas products and by-products, the effect of state or federal commodity allocation requirements which might be applicable to those products and by-products, and the priorities among competing needs."

This report is preliminary. Input data and results have not been thoroughly checked or reviewed.

Alaska Open File Report #90

PRESENT AND HISTORICAL DEMAND FOR OIL AND GAS IN ALASKA

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August 1975

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PRESENT DEMAND

Introduction

The first step in determining the future demand for oil and natural gas in Alaska is to evaluate the present consumption. To accomplish this, it is necessary to gather data from a myriad of different sources including federal and state agencies, oil and gas companies, and in some cases individual consumers such as the various branches of the military. See table P-8 for a list of data sources.

Discussion of the Data

Data has been collected for the years 1972, 1973 and 1974. The data was compiled by district, commodity and use, and projected to state wide total demand for this report. The next progress report will include the district, present and historical demand analysis. The data is presented in tables and charts with a few comments concerning the significant points.

FIGURE P-1 HISTORICAL OIL CONSUMPTION

Historical oil consumption has steadily increased from 16.5 million BOE in 1972 to 20.5 million in 1974. As can be seen on figure P-1 this 25% increase is almost totally due to the increase in motor fuels. The 1973-1974 picture reflects a definite change in the historical pattern. A down swing in marine use probably caused by problems in the fishing industry and a cutback in the rate of increase in aviation and heating are completely offset by a strong Trans-Alaska Pipeline oriented surge in highway use. Power generation use of oils remains almost constant as would be

expected since the areas outside of the Anchorage-Fairbanks impacted zones are the principal users of oil electric generation.

FIGURE P-2 HISTORICAL NATURAL GAS CONSUMPTION

Natural gas consumption has been slowly increasing for power generation and heating a reflection of population increase. Non-energy uses are primarily the gas consumed by the ammonia-urea plant, and oil industry internal usage for field maintenance etc. Gas losses took a sharp decline in 1973 due to a decrease in natural gas flaring; flaring increases in 1974 brought the losses back up to approximately half of the 1972 figure.

FIGURE P-3 HISTORICAL OIL AND NATURAL GAS CONSUMPTION

This chart illustrates the comparative difference in the recent Trans-Alaska Pipeline.related oil use increase and the population related natural gas generation of heat and power. The natural gas consumption should start rising more rapidly in 1975 when impact-related population increases are seen in Anchorage.

FIGURE P-4 OIL AND NATURAL GAS CONSUMPTION

This table gives the barrels of oil equivalent (BOE) values for oil and natural gas consumption for 1972-1974. Percentages of the total oil and total gas for each type of use are given. These percentages have been used as sensitivity data in future demand studies.

FIGURE P-5 NATURAL GAS CONSUMPTION AND PRODUCTION

This table summarizes natural gas production and consumption in Alaska. It is interesting to note that in 1974 only 10% of the gas produced was used in electrical power generation and 5% was used in heating. Of the remaining 85%, 44% was used in State by the oil and gas industry mainly for reinjection, 36% was used for export products and 5% was attributed to gas loss.

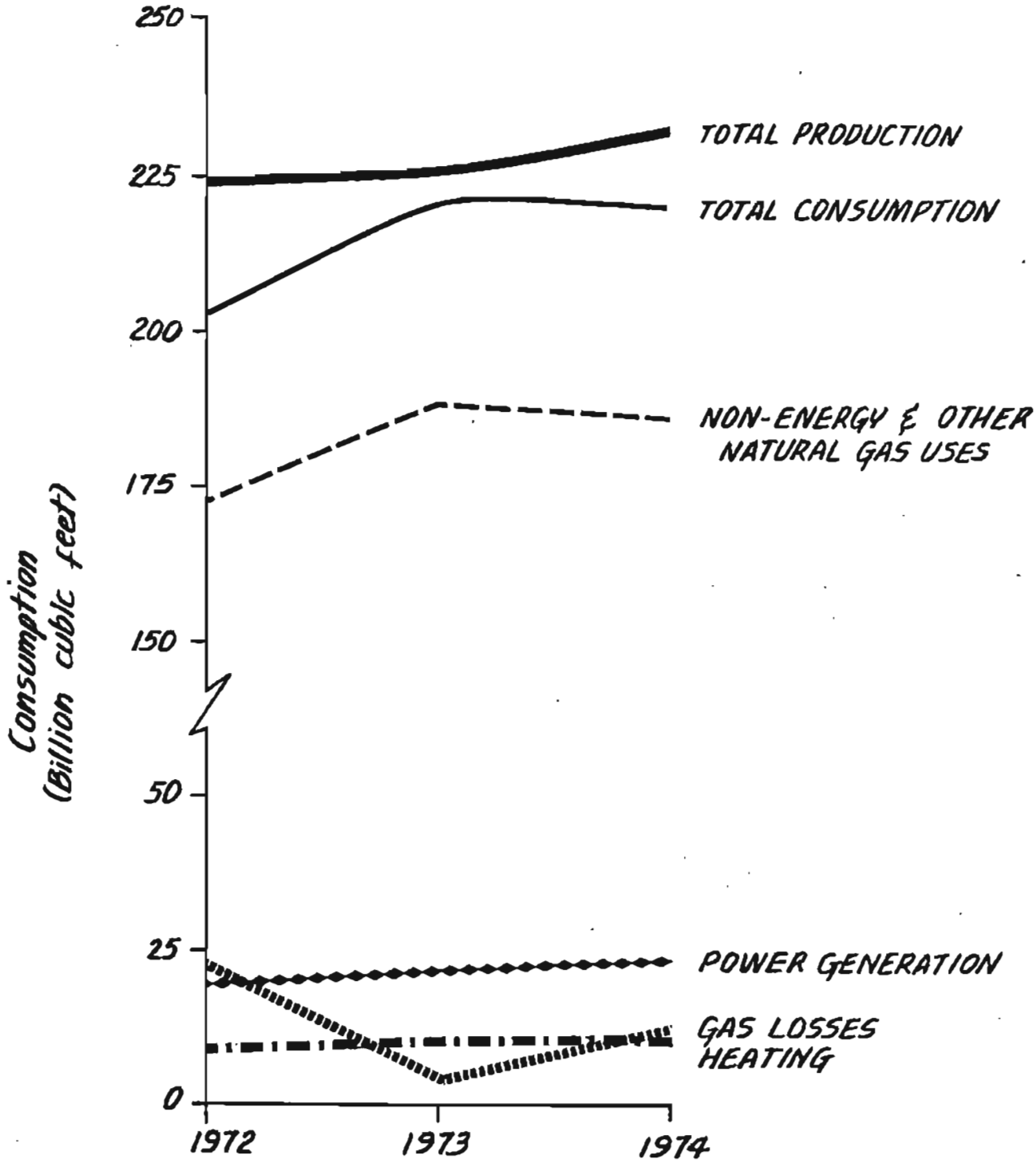
FIGURE P-6 PER CAPITA CONSUMPTION

In 1974 Alaskans used 409 gallons of gasoline (8.38 BOE) for every man, woman, and child in the State. Per capita consumption is one of the key parameters for the analysis of present and future demand. Table P-6 gives the per capita consumption background data by major oil and gas use for the years 1972-1974. It is interesting to note that highway use of motor gasoline actually declined from 8.94 BOE per capita in 1972 to 8.38 BOE in 1974. This indicates a cut-back in the personal driving habits of our citizens probably related to increasing costs of gasoline and automobiles. During this period highway diesel consumption per capita rose, reflecting the Trans-Alaska Pipeline-related increases in truck traffic. Problems in the fishing industry are indicated by the sharp drop in marine diesel consumption in 1974.

FIGURE P-7 ALASKAN OIL AND GAS UTILIZATION 1974

This plumbing diagram dramatically illustrates the relationship between the oil and gas commodity and its use. Values are given in million's of

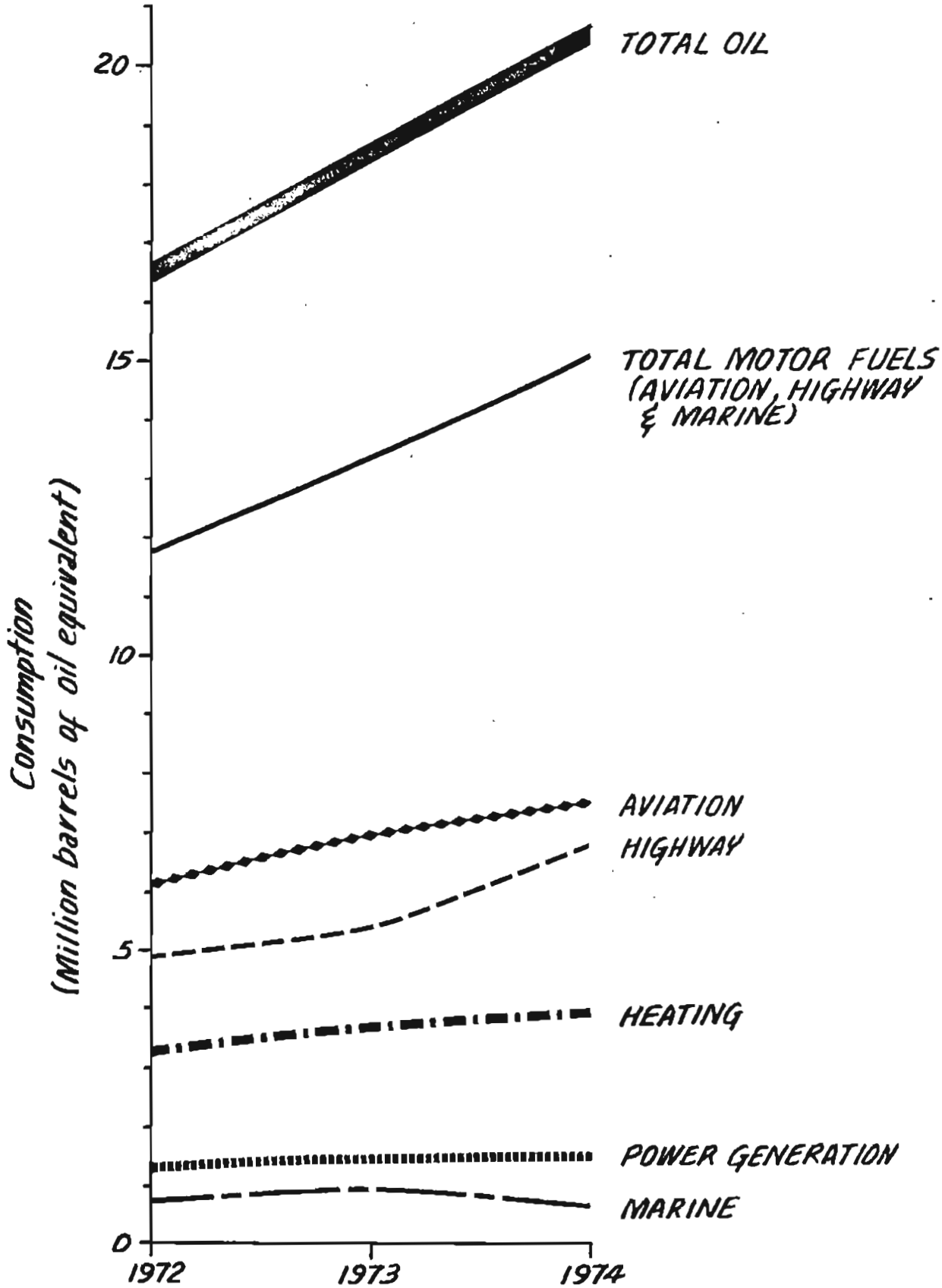
barrels equivalent per year (BOE) so that the percentage of total oil and gas energy used can be compared. This diagram will be valuable for comparison with the energy use diagrams developed for future years' projections (changes in industrial and social patterns can be seen with these diagrams). Note that only 37% of our natural gas is used for heating and power generation.



HISTORICAL NATURAL GAS CONSUMPTION

DGGS
AUGUST 1975

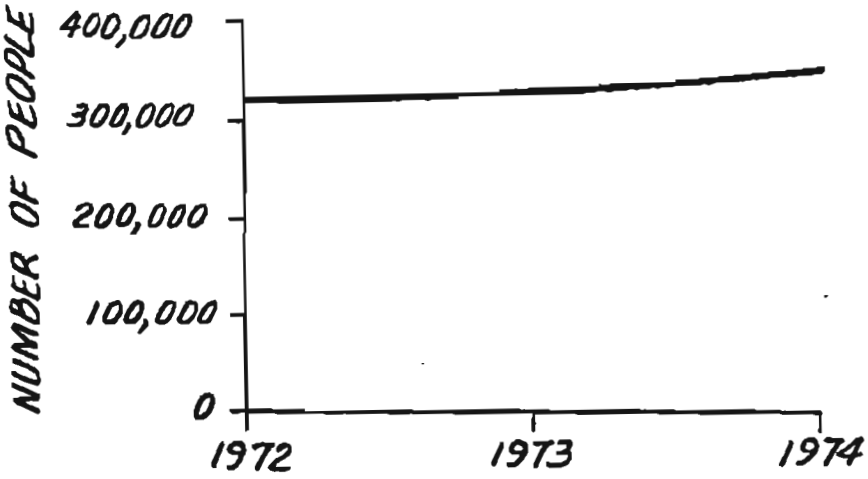
FIGURE P-1



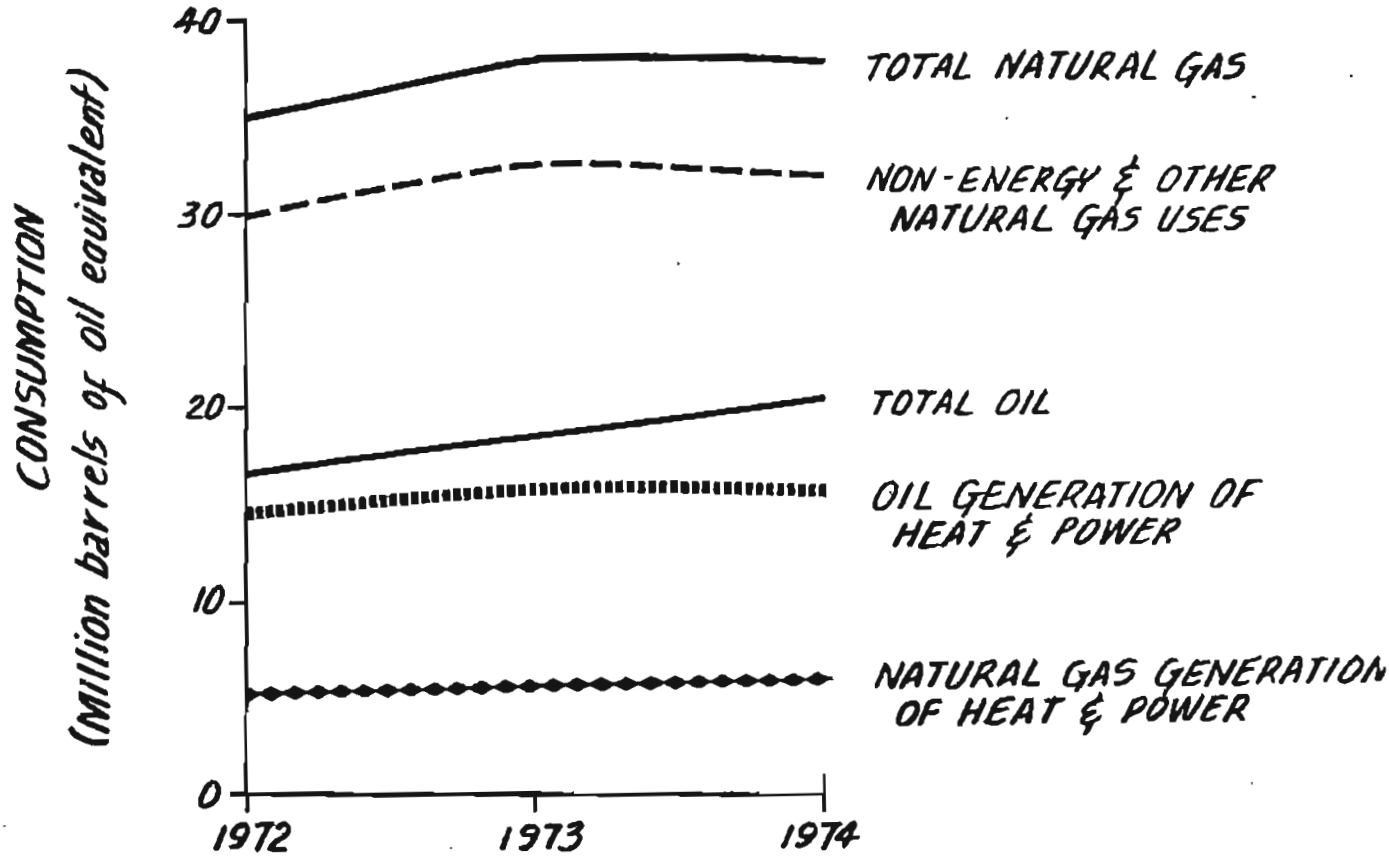
HISTORICAL OIL CONSUMPTION

DGGS
AUGUST 1975

FIGURE P-2



POPULATION



HISTORICAL OIL & NATURAL GAS CONSUMPTION

DGGS
AUGUST 1975

FIGURE P-3

OIL & NATURAL GAS CONSUMPTION

	1972				1973				1974			
POPULATION	322,115				330,300				350,700			
	Million BOE	% Oil of Total Oil	% Gas of Total Gas	% Total Oil & Gas	Million BOE	% Oil of Total Oil	% Gas of Total Gas	% Total Oil & Gas	Million BOE	% Oil of Total Oil	% Gas of Total Gas	% Total Oil & Gas
MOTOR FUELS												
Aviation: Jet	5.92	36%		27%	6.75	36%		29%	7.26	35%		27%
Gas	.27	2%		1%	.26	2%		1%	.31	2%		1%
	6.20	38%		28%	7.01	38%		30%	7.57	37%		28%
Marine: Gas	.10	1%		0.5%	.13	1%		0.5%	.13	1%		0.5%
Diesel	.65	4%		3.0%	.81	4%		3.4%	.55	3%		2.0%
	.75	5%		3.5%	.94	5%		3.9%	.68	4%		2.5%
Highway: Gas	2.88	17%		13%	2.75	15%		11%	2.94	14%		11%
Diesel	1.96	12%		9%	2.66	14%		11%	3.88	19%		15%
	4.84	29%		22%	5.41	29%		22%	6.82	33%		26%
Other	.01				.01				.02			
TOTAL	11.80	72%		54%	13.36	72%		56%	15.09	74%		57%
POWER GENERATION												
Oil	1.40	8%		7%	1.50	8%		6%	1.50	7%		6%
Natural Gas	3.46		25%	16%	3.83	(69%)	26%	16%	4.08	(69%)	26%	15%
	4.86			23%	5.33			22%	5.58			
HEATING												
Oil	3.27	20%		15%	3.70	20%		15%	3.93	19%		15%
Natural Gas	1.64		12%	8%	1.75		12%	7%	1.79	(31%)	12%	7%
	4.91			23%	5.45			22%	5.72			
NON-ENERGY USES *												
Natural Gas	8.87		63%		9.17		62%		9.56		62%	
TOTAL OIL	16.47	100%		76%	18.56	100%		77%	20.52	100%		78%
TOTAL NATURAL GAS	13.97		100%	24%	14.75		100%	23%	15.43		100%	22%
TOTAL OIL & NATURAL GAS	21.57			100%	24.14			100%	26.39			100%

* Non-energy and other uses by the oil and gas industry (i.e. ammonia-urea plant, etc.)

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Figure P-4

NATURAL GAS CONSUMPTION AND PRODUCTION 1972-1974*

	1972			1973			1974		
POPULATION	322,115			330,300			350,700		
NATURAL GAS	MCF	% Total Consumption	% Total Production	MCF	% Total Consumption	% Total Production	MCF	% Total Consumption	% Total Production
Power Generation	19,979,433	10%	9%	22,125,927	10%	10%	23,574,300	11%	10%
Heating	9,461,934	5%	4%	10,128,782	5%	4%	10,354,253	5%	5%
Sub total	29,441,367	15%	13%	32,254,709	15%	14%	33,928,553	16%	15%
Oil & Gas Industry									
In-State									
Oil & Gas Production**	90,506,649	45%	40%	106,005,793	48%	47%	101,179,216	46%	44%
Other	86,603			209,680			247,975		
	90,593,252			106,215,473			101,427,191		
Export									
Gas Liquefaction	60,005,622	40%	37%	61,122,268	37%	37%	62,491,912	38%	36%
Ammonia-Urea Plant	21,637,106			20,472,746			21,013,109		
	81,642,728			81,595,014			83,505,021		
Sub total	172,235,980	85%	77%	187,810,487	85%	84%	184,932,212	84%	80%
Total Consumption	201,677,347	100%	90%	220,065,196	100%	98%	218,860,765	100%	95%
Gas Loss	22,444,648	---	10%	4,442,056	---	2%	12,344,896	---	5%
Total Production	224,121,995	---	100%	224,507,252	---	100%	231,205,665	---	100%
NATURAL GAS LIQUIDS									
Propane sold in Alaska	Incomplete			1791 MCF (318,230 barrels)			1973 MCF (350,569 barrels)		
Extraction Plants									
Butane (export)	3345 MCF (594,426 barrels)			4009 MCF (712,370 barrels)			3919 MCF (696,352 barrels)		
Propane (export)	68.3 MCF (12,138 barrels)			553.5 MCF (98,348 barrels)			540.1 MCF (95,966 barrels)		

* All gas from Cook Inlet unless indicated differently. Cook Inlet gas has 1005 BTU per cubic foot.

** Includes some Prudhoe Bay gas.

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August 1975

Figure P-5

PER CAPITA CONSUMPTION
OIL & NATURAL GAS
1972 - 1974

BOE/person/year

	1972	1973	1974
MOTOR FUELS			
Aviation: Jet	18.38	20.44	20.70
Gas	.84	.79	.88
	19.25	21.22	21.58
Marine: Gas	.31	.39	.37
Diesel	2.02	2.45	1.57
	2.33	2.85	1.94
Highway: Gas	8.94	8.33	8.38
Diesel	6.08	8.05	11.06
	15.03	16.38	19.45
Total Motor Fuels	36.63	40.45	43.03
POWER GENERATION			
Oil	4.35	4.54	4.28
Natural Gas	10.74 (62.0 mcf)	11.61 (67.0 mcf)	11.64 (67.2 mcf)
	15.09	16.15	15.92
HEATING			
Oil	10.15	11.20	11.21
Natural Gas	5.09 (29.4 mcf)	5.31 (30.7 mcf)	5.12 (29.5 mcf)
	15.24	16.51	16.33
TOTAL OIL	51.13	56.19	58.51
TOTAL NATURAL GAS	15.83 (91.4 mcf)	16.92 (97.7 mcf)	16.76 (96.7 mcf)
TOTAL OIL & NATURAL GAS	66.96	73.11	75.27

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Figure P-6

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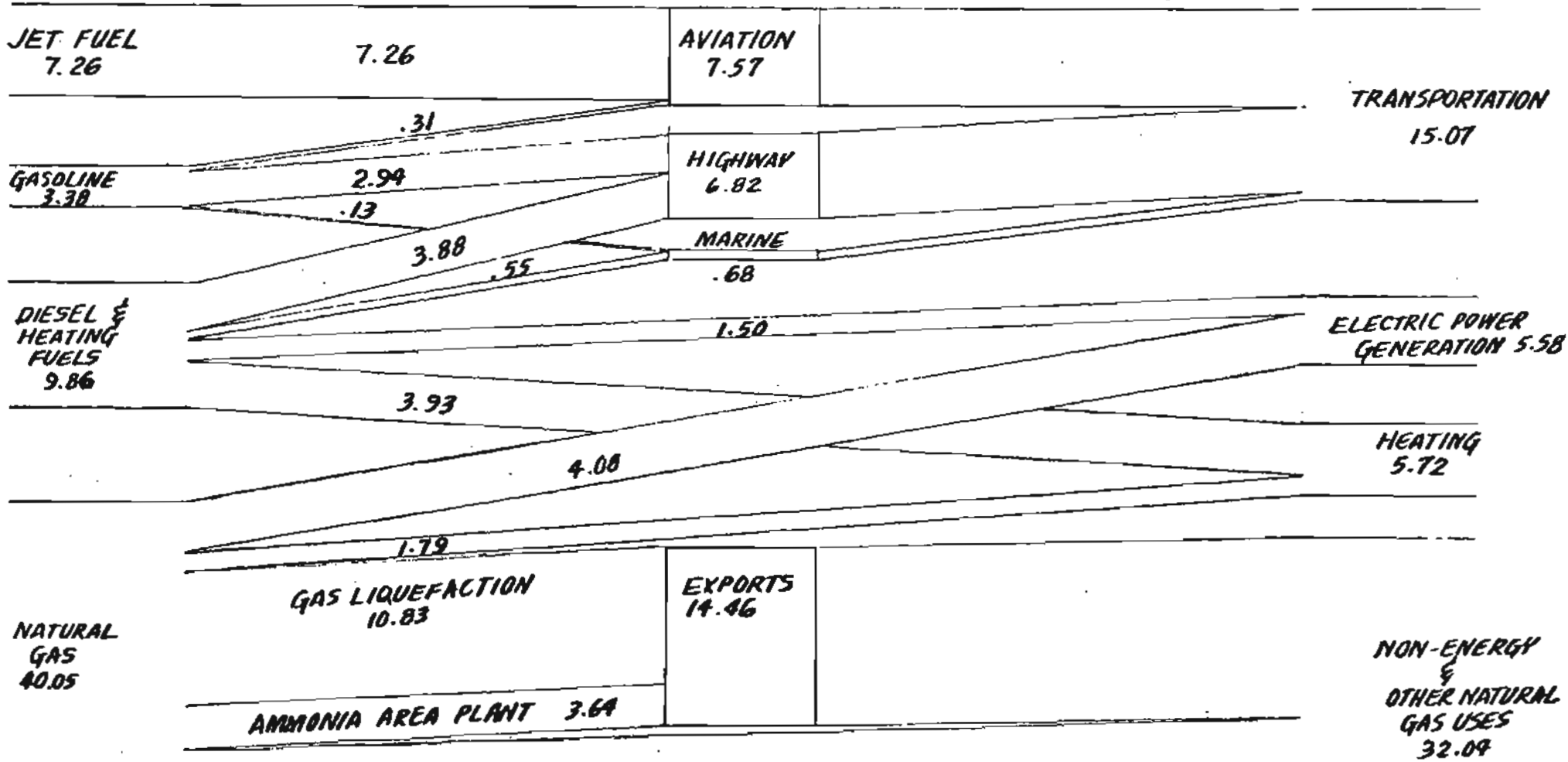

IN-STATE GAS: (FIELD MAINTENANCE, REINJECTION & OTHER USES BY THE OIL & GAS INDUSTRY).

ALASKAN OIL & GAS UTILIZATION* - 1974

* Figures in millions of barrels of oil equivalent.

SOURCES OF DATA ON ENERGY USE IN ALASKA

State and City Agencies

Alaska Energy Office - Office of Governor
Department of Public Works
Division of Aviation
Department of Highways
Public Utility Commission
Department of Labor
Economic Development
Department of Revenue
Department of Administration
Department of Fish and Game
Teletype Communications Office
Greater Anchorage Area Borough
University of Alaska
Alaska State Ferry System
Institute of Social, Economic, & Gov't. Research
Arctic Environmental Info. & Data Center

Federal Agencies

Federal Bureau of Mines
Federal Energy Administration
Forest Service
Bureau of Land Management
Alaska Power Administration
National Marine Fisheries Service
Environmental Protection Agency
Joint Federal-State Land Use Planning

Utilities

Public Utilities
Private Utilities
Alaska Village Electric Corporation
Natural Gas Companies
REA Utilities
Other Cooperative Utilities

Military

Army Corps of Engineers
Coast Guard
Army
Air Force
Navy

Oil and Gas Industry

Alaska Oil & Gas Association
Standard Oil Company
Standard Oil of Ohio
Union Oil Company
Mobil Oil Company
Shell Oil Company
Tesoro
Atlantic Richfield Company
British Petroleum Alaska
Texaco
El Paso Natural Gas Company
Collier Carbon & Chemical Corp.
Dow Chemical Corporation

Other Private Industry

Fisheries
Lumbering
Tourism
Mining
Agriculture
Banks

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Figure P-8

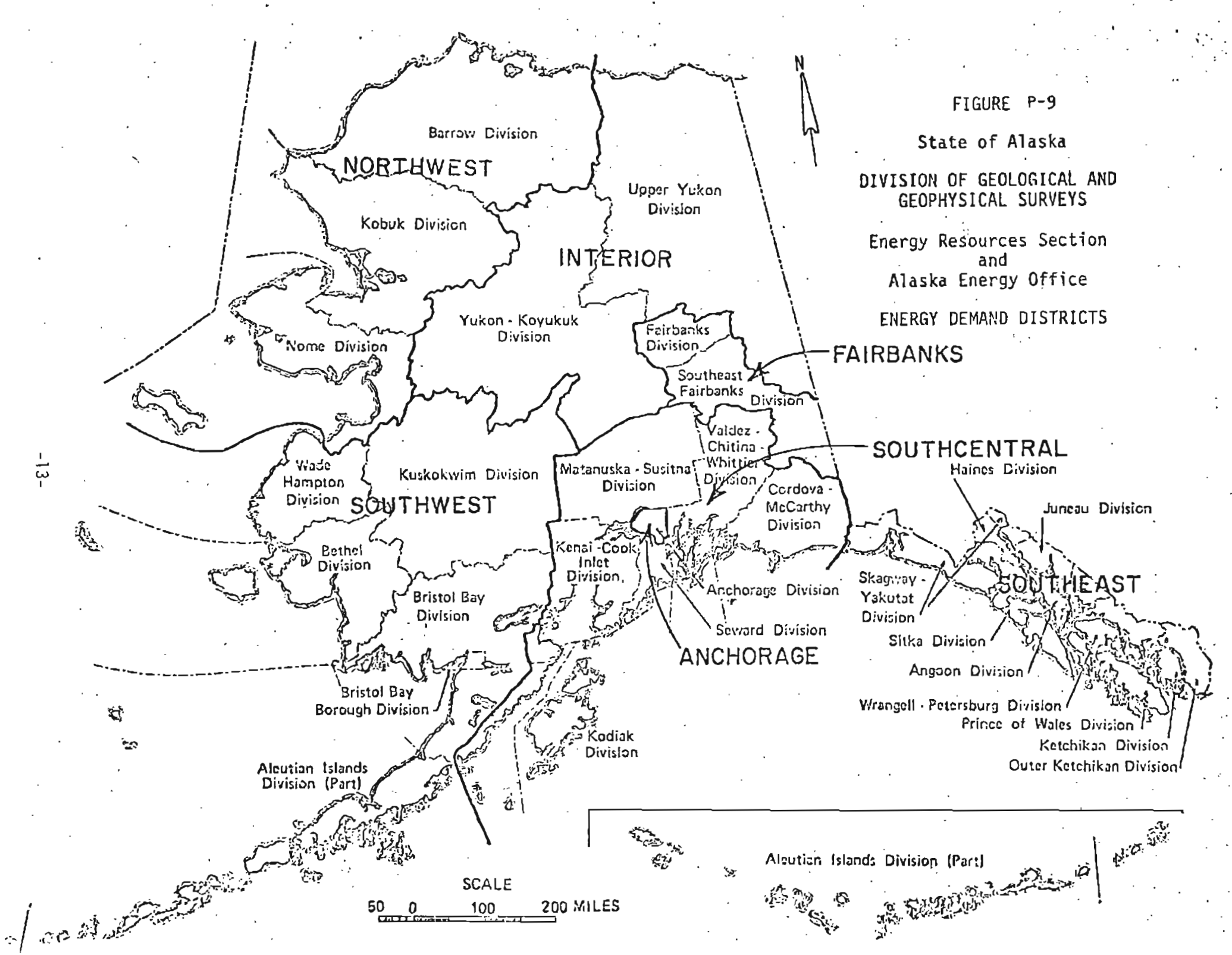
FIGURE P-9
State of Alaska
DIVISION OF GEOLOGICAL AND GEOPHYSICAL SURVEYS
Energy Resources Section
and
Alaska Energy Office
ENERGY DEMAND DISTRICTS
N
NORTHWEST
Barrow Division
Kobuk Division
Upper Yukon Division
INTERIOR
Yukon - Koyukuk Division
Nome Division
Fairbanks Division
FAIRBANKS
Southeast Fairbanks Division
Valdez - Chitina - Whittier Division
SOUTHCENTRAL
Haines Division
Juneau Division
Wade Hampton Division
SOUTHWEST
Kuskokwim Division
Matanuska - Susitna Division
Cordova - McCarthy Division
Bethel Division
Kenai - Cook Inlet Division
Anchorage Division
Skagway - Yakutat Division
SOUTHEAST
Bristol Bay Division
Seward Division
ANCHORAGE
Sitka Division
Angoon Division
Bristol Bay Borough Division
Wrangell - Petersburg Division
Prince of Wales Division
Ketchikan Division
Outer Ketchikan Division
Kodiak Division
Aleutian Islands Division (Part)
Aleutian Islands Division (Part)
SCALE
50 0 100 200 MILES

CONVERSION FACTORS

OIL:

1 barrel	=	4.2 gallons
1 barrel crude oil	=	5.8 million BTU
1 barrel fuel oil	=	5.8 million BTU
1 barrel diesel or heating fuel	=	5.7 million BTU
1 barrel jet fuel	=	5.2 million BTU
1 barrel gasoline	=	5.0 million BTU

(1 BTU = British Thermal Unit)

NATURAL GAS:

1 barrel	=	5.628 cubic feet N.G.
1 cubic foot LNG	=	600 cubic feet N.G. (-269°F)
1 cubic foot Cook Inlet gas	=	1005 BTU
1 cubic foot Prudhoe Bay gas	=	1130 BTU

(1 mcf = one thousand cubic feet)

BOE:

1 BOE = 1 barrel crude oil = 5.8 million BTU

gallon's fuel oil	÷	42	=	BOE'S
gallon's diesel or heating fuel	X	.0234	=	BOE'S
gallon's jet fuel	X	.0213	=	BOE'S
gallon's gasoline	X	.0205	=	BOE'S
mcf's Cook Inlet gas	X	.17328	=	BOE'S
mcf's Prudhoe Bay gas	X	.19483	=	BOE'S

(Total U.S. Energy Consumption 1972 = 1972 quadrillion BTU)
= 1,972,000,000,000,000,000 BTU

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Figure P-10